Effect of the TLEs-receiver distance on the signal perturbations properties

S.NAITAMOR, O.BOUMIA, T.ABDELATIF
Past analysis using two receivers in different locations showed that the TLE-Receiver distance plays an important role in determining the VLF signals perturbations properties.
In this present work we will use one receiver data observation of different events locations.

Event 1: -4.63°E 48.57°N
Event 2: 0.99°E 40.87°N
Event 3: 4.37°E 40.01°N
Event 4: 5.59°E 43.83°N
Event 1 & 2 comparison

Event 1: -4.63 °E  48.57 °N
Amp = 1 dB
Perturbation duration ~ 240 s

Event 2: 0.99 °E  40.87 °N
Amp ~ 0.8 dB
Perturbation duration > 280 s
Event 3 & 4 comparison

Event 3: 4.37 °E 40.01 °N
Amp = 1 dB
Perturbation duration > 180s

Event 4: 5.59 °E 43.83 °N
Amp = 3 dB
Perturbation duration ~ 120s
Perturbations due to distant disturbances have a short recovery time
Two Receivers signals perturbations in association with a Gigantic Jet
In time interval of 120 ms, two TLEs were captured: A GJ after the –CG and a Sprite after the +CG.

From the plot the Early signal perturbation reached its maximum in 40 ms after the –CG and 60 ms before the +CG.

After the +CG the perturbation continued in both signals.
Two receivers data comparison

The distant receiver did not record a significant perturbation associated to the GJ

The signal perturbation recovered rapidly in the distant receiver data than the near receiver one
Conclusion

The data comparison proved that the distance to the receiver plays an important role in determining the signals perturbations amplitudes and the recovery time.

The statistical study showed that the distant disturbances have their associated perturbations with small amplitudes and short recovery time.

The comparison between the two receivers data (at Tunis and Sebha) in association with the GJ observation gives a clear evidence that some signal perturbation maybe missed by the distant receiver.
Thank you